



Natural Heritage & Endangered Species Program

Commonwealth of Massachusetts
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
www.nhesp.org
(508) 792-7270 ext. 200/fax (508)792-7821

Natural Community Fact Sheet High-Energy Riverbanks

Community Description

High-Energy Riverbank communities occur within the zone of active erosion and sedimentation of steep-gradient, fast-flowing rivers. They are characterized by cobble and sand substrates and sparse, open vegetation. High-Energy Riverbank communities occur as both narrow rocky zones along riverbanks and as large areas on the exposed, upstream ends of riverine islands. They are broadly defined communities with variation in structure and dominant species occurring both among rivers and among sites within rivers. The Massachusetts Natural Heritage & Endangered Species Program tracks occurrences of High-Energy Riverbank

communities that are dominated by prairie-type grasses and low shrubs. These sparsely vegetated herbaceous communities are called Riverside Sand/Gravel Barrens in the New Hampshire state vegetation classification and Riverside Sand/Gravel Bars in the New York classification. Another variant of the community, with good examples occurring on the Westfield River, is characterized by open, low forests dominated by sycamore and cottonwood.



A high energy riverbank community on Second Island, the Connecticut River, Massachusetts. Photo by Jennifer Kearsley

Environment

High-Energy Riverbank environments are created by the alluvial deposition of cobbles, sand and silt during high spring flood events, and they are shaped by continued annual flood events and winter ice scour. Differences in severity of scouring and flooding create a gradient of substrate types from the river's edge to the upland transition. Scouring and flooding are most intense at the river's edge (i.e. the upstream end of riverine islands) which received the full force of ice floes and debris-laden waters. In the fast-moving water, only large cobbles are heavy enough to drop out of suspension. As the water crosses the cobblebar it slows down and smaller particles drop out, creating a gradient from cobbles and pebbles to sand and silt. That gradient correlates with a change in vegetation communities.

Characteristic plant species in Massachusetts

Vegetation zonation within High-Energy Riverbank communities corresponds with substrate type and severity of flooding. On open cobbles, false dragonhead (*Physostegia*

virginiana, an exotic), cocklebur (*Xanthium strumarium*), beggar's ticks (*Bidens* spp.) and lady's thumb (*Polygonum persicaria*, an exotic) are dominant. As the percent sand increases, water horsetail (*Equisetum fluviatile*) and clasping dogbane (*Apocynum cannabinum* var. *hypericifolium*) occur and there is typically a distinct band of switchgrass (*Panicum virgatum*). In the still sandier areas, mixed grasslands of switchgrass, big and little bluestem (*Andropogon gerardii* and *Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*) and goldenrods (*Solidago* spp.) are found. Riverine cobble bars are special because they are areas where grasses typical of the Midwestern prairies, such as big and little bluestem, are found growing.

Intense flooding and ice scour prevents establishment and growth of trees or tall shrubs in grassy riverside communities. However, short shrubs such as shadbush (*Amelanchier* spp.), silky dogwood (*Cornus amomum*), sandbar willow (*Salix exigua*) (SC) and sandbar cherry (*Prunus pumila* var. *depressa*) (SC) form a vegetation zone on the sandiest sections, typically bordering floodplain forests that occupy siltier soils.

Rare Plant Species in Massachusetts

Tufted hairgrass (*Deschampsia cespitosa* var. *glauca*) (E) and shore aster (*Aster tradescantii*) (SC) are state-listed herbaceous taxa found in High-Energy Riverbank communities. The two shrubs that characterize the sandier areas of this community type, Sandbar willow (*Salix exigua*) (SC) and sandbar cherry (*Prunus pumila* var. *depressa*) (SC) are both state-listed.

SC=State Special Concern, E=State Endangered

Characteristic Animal Species in Massachusetts

High-Energy Riverbank communities are very open. They provide suitable habitat for migrating shorebirds, such as Dunlins and Spotted Sandpipers, and for other birds that prefer open habitats, such as Killdeer. Dragonfly and tiger beetle larvae live in burrows in sand between cobbles and boulders; adult tiger beetles forage on sand above the high-water mark.

Rare Animal Species in Massachusetts

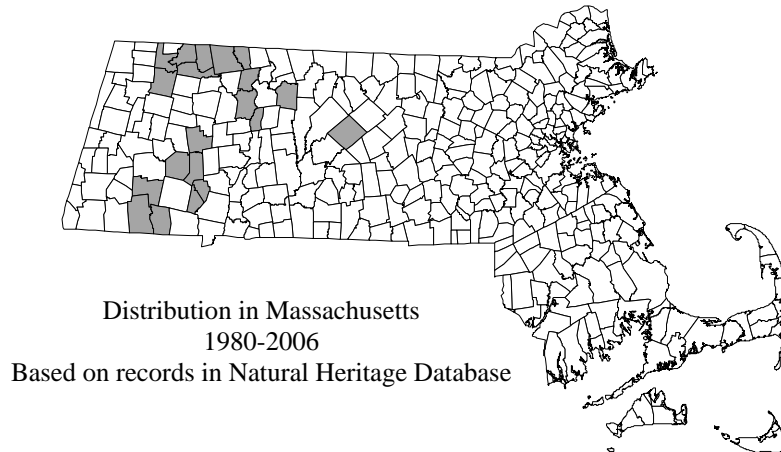
High-Energy Riverbank communities provide critical habitat for state-protected rare dragonfly and tiger beetle larvae. The larvae of the state-protected dragonfly species Cobra clubtail (*Gomphus vastus*) (SC), Skillet clubtail (*Gomphus ventricasus*) (SC), Arrow clubtail (*Stylurus spiniceps*) (T) and Midland clubtail (*Gomphus fraternus*) (E) live in burrows in the sand between cobbles and boulders below the high-water mark. Larvae of the state-protected Twelve-spotted tiger beetle (*Cicindela duodecimguttata*) (SC) live in burrows higher up on the cobble bar where inundation is periodic.

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Range

High-Energy Riverbank communities are rare in Massachusetts because they can only form in steep-gradient, high-flood areas such as those that occur on the Connecticut and Deerfield Rivers. They typically occur on the upstream end of riverine islands or on river

bends. Excellent examples of the community type in Massachusetts can be found on the upstream ends of the Sunderland Islands north of Sunderland Bridge on the Connecticut River (Franklin Co.). This community type is more common in mountainous states with steep-sided, fast-flowing rivers such as New York, New Hampshire and Vermont.



Threats and Management Recommendations

The two major threats to high-energy river communities are alteration of natural flooding regimes due to river control projects and the invasion of non-native plant species. High-energy riverbank environments are created by severe flooding and ice scour, and these natural disturbance regimes are necessary to maintain the community. Because of the community's exposure to flooding, it is susceptible to colonization of exotic plants, such as purple loosestrife (*Lythrum salicaria*) and lady's thumb (*Polygonum persicaria*), that have their seeds washed in from upstream sources. Trampling from campers and boaters creates further disturbance and favors fast-growing exotic plants. Where possible, highly invasive exotic plants should be mechanically removed. Management to reduce non-native plant species throughout a drainage basin will help preserve the native plant communities of high-energy riverbanks.

*Originated: 1998
Updated: 2006*